CLAIMS

1. Baling apparatus comprising at least two first and second mutually opposed and inclined conveyors, each conveyor having a first end and a second end, the second ends being arranged to be spaced apart to form a material entry region into which material to be baled is, in use, deposited, the first ends being relatively closely adjacent to each other, and the apparatus being arranged such that material deposited into the entry region moves toward a pinch region where the two conveyors are close to one another and where the deposited material is rolled and compressed into a bale, the conveyors being driven in opposite directions to roll and compact the material between them, and the conveyors being mutually displaceable and resiliently biased towards one another.

2. The apparatus of claim 1, wherein each conveyor comprises a plurality of rollers around which extends a continuous belt.

3. The apparatus of claim 2, wherein each conveyor comprises at least a pair of end rollers, defining outer limits of the conveyor and at least one intermediate roller.

4. The apparatus of any of claim 3, wherein the first and second conveyors are driven at different surface speeds such that one conveyor runs faster than the other.

5. The apparatus of claim 4, wherein the faster conveyor runs in a direction to urge material from the entry region toward the pinch region.

6. The apparatus of claim 5, wherein, in use, the material being turned by the belts is pulled down by the faster conveyor, whilst the slower upward belt holds back the material so as to cause a "winding up" of the material.

7. Apparatus according to any of claims 3 to 6, wherein the roller of each conveyor located at the respective first end has a substantially fixed rotational axis, whilst the rotational axes of the intermediate roller or rollers and of the roller located at the second end of at least one of the conveyors are biased by resilient biasing means such that they may travel along fixed paths guided by guide means as more material is deposited into the entry region.

8. The apparatus of claim 7, wherein, in use, the pinch region is broadened as more material is deposited.

9. The apparatus of claim 7 or 8, wherein the second ends of the conveyors are arranged, in use, to diverge as more material accumulates between the two opposed conveyors.

10. The apparatus of any of claims 7 to 9, wherein guide means are provided associated with each conveyor and each such guide means comprises a guide having first and second ends, and wherein resilient biasing means are provided associated with each conveyor, the resilient biasing means acting so as to bias the first and second conveyors toward the first ends of each guide, in which

position the first and second conveyors are nearest to one another.

11. The apparatus of claim 10, wherein, in use, as more and more material is deposited into the gap between the two conveyors, the resilient biasing means acts to compact the material mass held at the pinch region.

12. The apparatus of claim 11, wherein as more and more material is, in use, compacted between the conveyors and the size of the compacted material held between them increases, the force exerted by the resilient biasing means is opposed by the growth in size of the material being compacted between the conveyors, such that the gap between the conveyors at the pinch region is allowed to increase by outward movement of the rotational axes of at least the intermediate rollers of said conveyors, such outward movement being in the direction of the second ends of respective guide means.

13. The apparatus of claim 12, wherein as yet more material is, in use, compacted between the conveyors and the size of the compacted material held between them increases, the force exerted by the resilient biasing means is opposed by the growth in size of the material being compacted between the conveyors, such that the gap between the conveyors at the second ends is allowed to increase by outward movement of the rotational axes of the rollers at the second ends of the conveyors, such outward movement being in the direction of the second ends of respective guide means.

14. The apparatus of any of claims 7 to 13, wherein the resilient biasing and the guide means comprise separate means.

15. The apparatus of claim 14, wherein the resilient biasing means and guide means operate along shared axes, each guide means being associated with its own resilient biasing means.

16. The apparatus of claim 14, wherein the resilient biasing means and the guide means operate along separate axes, with each resilient biasing means being associated with a plurality of respective guide means.

17. The apparatus of claim 16, wherein a single resilient biasing means is associated with a single conveyor.

18. The apparatus of any of claims 7 to 17, wherein the guide means comprise slots formed in chassis members constricting movement of rollers of one or more of the conveyors to particular pathways.

19. The apparatus of any of claims 7 to 18, wherein means are provided for mutually spreading the second ends of the conveyors following the end of a baling operation to facilitate the removal of material which has been compacted between the conveyors.

20. The apparatus of claim 19, wherein the means for spreading comprises disengaging at least one second end from its associated resilient biasing means to allow said

at least one second end to be freely moved away from the second end of the other conveyor.

21. The apparatus of claim 19, wherein the means for spreading comprises disengaging an associated resilient biasing means from a fixed chassis mounting point to allow both the resilient biasing means and the associated second end of conveyor to move.

22. The apparatus of claim 19, wherein the means for spreading comprises means for pivoting one conveyor away from the other.

23. Apparatus according to any of claims 3 to 22, wherein means for facilitating the removal of compacted material from the apparatus comprise movement of the first and second conveyors away from one another to provide access to the compacted material.

24. The apparatus of claim 23, wherein, the first conveyor is supported by a first sub-chassis, and the second conveyor by a second sub-chassis, removal of the compacted material being facilitated by disassociating the first sub-chassis from the second sub-chassis.

25. The apparatus of any of claims 3 to 24, wherein in an initial state of the apparatus, at least one pair of opposed rollers of the two conveyors have central axes which are vertically displaced from one another, and are separated horizontally from each other by a horizontal distance which is less than a sum of the radii of the respective two rollers.

26. The apparatus of claim 25, wherein the opposed rollers in question comprise rollers at the first end of the conveyors.

27. The apparatus of claim 25 or 26, wherein the rollers in question comprise a pair of intermediate rollers positioned above the pinch region.

28. The apparatus of any of claims 3 to 27, wherein the pinch region is located at a point intermediate the first and second end of each conveyor.

29. The apparatus of claim 28, wherein the conveyors are resiliently biased towards one another at the pinch region.

30. The apparatus of claim 29, wherein at least one intermediate roller of one of the conveyors is resiliently biased toward the pinch region such that as more material is baled between the opposed conveyors the resilient biasing acts to compact the material.

31. The apparatus of claim 30, wherein the at least one intermediate roller is resiliently biased toward the pinch region, such that as more material is deposited into the pinch region, intermediate rollers of the opposed conveyors are forced away from one another along defined paths.

32. The apparatus of any of claims 3 to 31, wherein during an initial state in which the apparatus has no material deposited into it, at least one intermediate roller of one conveyor is arranged to not be in contact

with its respective belt, such that the belt is not directly supported in the area of the pinch region.

33. Apparatus according to claim any of claims 28 to 32, wherein the pinch region is defined by an adjacent relation of intermediate rollers of the opposed conveyors forming an area of constriction within which, in use, material to be baled gathers to be rolled.

34. The apparatus of any of claims 28 to 33, wherein said conveyors comprise a pair of conveyors which, in an initial state, are arranged in a Y formation, the first ends of the conveyors forming the base of the Y, and the second ends forming the top of the Y.

35. Apparatus according to any of claims 1 to 26, wherein said conveyors comprise a pair of conveyors driven in opposed directions and provided in a V formation, the first ends of the conveyors forming the base of the V, and the second ends forming the top of the V.

36. Apparatus according to any preceding claim, wherein each conveyor has a belt of substantially constant length, the conveyors being arranged so as to bow outwardly as the circumference of baled material held between them increases, avoiding the need for a separate belt take-up means.

37. Apparatus according to any of the preceding claims, wherein means are provided for gathering material falling outside of the entry region to re-incorporate such material.

38. The apparatus of claim 37, wherein the means for gathering material comprise an outer skin positioned toward a return side of each conveyor away from a baling side, the outer skin being arranged such that when the bale is near a maximum size, the conveyor is arranged to pick up such material trapped between it and the outer skin and transport this material toward the pinch region.

39. Apparatus according to any preceding claim, wherein the apparatus further comprises a bale wrapping mechanism for wrapping completed bales.

40. A method of baling material, the method comprising:

(A) depositing material to be baled into an entry region formed between first and second mutually inclined and opposed conveyors;

(B) driving the conveyors in opposite directions to roll the deposited material between them; and

(C) resiliently biasing the conveyors toward one another at a pinch region to compact the deposited material into a bale.

41. The method of claim 40, wherein material deposited in step (A) is moved from a relatively wide entry region to the narrower pinch region where it is compacted and rolled.

42. The method of claim 41, wherein movement from the wide entry region to the narrower compaction region may be

under gravity, air/gas pressure, friction or hydraulic pressure or any combination thereof.

43. The method of claim 40, 41 or 42, wherein, the conveyors are biased towards one another by resilient biasing means.

44. The method of claim 43, wherein as more material is deposited, the pinch region is arranged to expand against the action of the resilient biasing to compress material within the pinch region.

45. The method of claim 44, wherein as more material is deposited, the entry region is arranged to expand to allow entry of more material and, under action of the resilient biasing to compact it.

46. The method of any of claims 40 to 45, wherein the first and second conveyors include belts which are driven at different speeds such that one conveyor runs faster than the other.

47. The method of claim 46, wherein the faster conveyor has a belt which runs in a direction to urge material from the entry region toward the pinch region.

48. The method of any of claims 40 to 47, wherein in an initial state of the apparatus, at least one pair of opposed rollers of the two conveyors have central axes which are vertically displaced from one another, and are separated horizontally from each other by a horizontal distance which is less than a sum of the radii of the respective two rollers.

49. The method of claim 48, wherein the opposed rollers in question comprise rollers at the first end of the conveyors.

50. The method of claim 48 or 49, wherein the opposed rollers in question comprise at least a pair of intermediate rollers positioned above the pinch region.

51. The method of any of claims 40 to 50, wherein during an initial state in which the apparatus has no waste material deposited into it, at least one intermediate roller of one conveyor is arranged to not be in contact with its respective belt, such that the belt is not directly supported in the area of the pinch region.

52. The method of any of claims 40 to 51, wherein in an initial state, at least one pair of opposed rollers of the two conveyors have central axes which are vertically displaced from one another, and are separated horizontally from each other by a horizontal distance which is less than a sum of the radii of the respective two rollers.

53. A method according to any of claims 40 to 52, wherein prior to step (A), material is shredded.

54. A method according to any of claims 40 to 53, wherein means are provided for wrapping baled material following a compaction operation.

55. A method according to any of claims 40 to 54, wherein removal of compacted material may be carried out

following the end of a baling operation by spreading second ends of the conveyors.

56. A method according to claim 55, wherein spreading comprises disengaging at least one second end from associated resilient biasing means to allow said at least one second end to be freely moved away from the second end of the other conveyor.

57. A method according to claim 55, wherein spreading comprises disengaging an associated resilient biasing means from a fixed chassis mounting point to allow both the resilient biasing means and the associated second end of conveyor to move.

58. A method according to claim 55, wherein spreading comprises pivoting one conveyor away from the other.